TEST REPORT

EN 62311

Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

Report Reference No. ..... :	422879-1TRFEMF	
Tested by (name, function and signature) ..... :	P. Barbieri	(project handler)
Approved by (name, function and signature) ..... :	D. Guarnone	(verifier)
Date of issue ..... :	2021-06-15	
Testing Laboratory ..... :	**Nemko Spa**	
Address ..... :	Via del Carroccio, 4 – 20853 Biassono (MB) – Italy	
Testing location	Nemko Spa	
Address ..... :	Via del Carroccio, 4 – 20853 Biassono (MB) – Italy	
Applicant's name ..... :	**Aesys SpA**	
Address ..... :	Via Artigiani, 41 – 24060 Brusaporto (BG) – Italy	
Test specification:		
Standard ..... :	EN 62311:2020 / IEC 62311:2019 EN 62311:2008 / IEC 62311:2007	
	Full application of the standards	☒
	Partial application of the standards	☐
Test procedure ..... :	Nemko WM L0077, WM L0177 and WM L1002	
Test Report Form No. ..... :	62311TRFEMF	
TRF Originator ..... :	Nemko Spa	
Master TRF ..... :	2017-10	

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Test item description ..... :	**Monitor**
Trade Mark ..... :	aesys
Manufacturer ..... :	Aesys SpA
Address of manufacturer ..... :	Via Artigiani, 41 – 24060 Brusaporto (BG) – Italy
Code ..... :	993202033501
Model name ..... :	CPTOU4615 LS P1L3ARIO2HS24G1WTTSPFACZ0
Ratings ..... :	220 – 240 V~, 50 / 60 Hz

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Test Report No. : 422879-1TRFEMF	2021-06-15 Date of issue

Short description of the EuT	Copy of marking plate
The E.U.T. a information monitor provided with an internal PC. The EUT use the following separatly approved radio module: - LTE/HSPA+/GSM module SIMCom model SIM7100E-PCIE - WIFI radio module Sparklan model WUBA-171GN - PMR radio module Elancitè model NF S32-002 - Antenna type Invax model DR70 The EUT is provided also with a slim soundbar code 993301701000 (Slim Soudbar 46" MC).	

Number of tested samples:	1
Serial number:	905150
Assigned band:	WIFI, LTE, UMTS, GSM
Antenna type:	External connector with dedicated antenna
Equipment use:	Fixed equipment
Accessories and detachable parts included:	The E.U.T. is composed of a single unit
Other options included:	--

Testing

Date of receipt of test sample:	2021-05-13
Testing commenced on:	2021-05-17
Testing concluded on:	2021-05-28

Possible test case verdicts:

test case does not apply to the test object:	N (Not applicable)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)

Symbols used in this test report

☒ The crossed square indicates that the listed condition or equipment is applicable for this report.

☐ The empty square indicates that the listed condition or equipment is not applicable for this report.

Throughout this report point is used as decimal separator.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

Verdict according to the standards listed at page 5:	**Pass**

PROJECT HISTORY		
Report number	**Modification to the report / comments**	**Date**
422879TRFEMF	First release	2021-05-31
422879-1TRFEMF	Added two standards	2021-06-15
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REMARKS		

PRODUCT VARIANTS		
Variant model	**Difference against the main model**	**Test performed**
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REMARKS		

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1 TEST STANDARDS

The tests were performed according to following standards and procedures.

NEMKO WM L0177: General routines for using instruments at Nemko

NEMKO WM L1002: Measurement Uncertainty - Policy and Statement

NEMKO WM L0077: General routines to perform EMC tests

[1] Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)

[2] EN 62311:2020 / IEC 62311:2019
Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

[2] EN 62311:2008 / IEC 62311:2007
Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

2 EQUIPMENT UNDER TEST

2.1 Power supply system utilised

Power supply voltage:	☒	230 V / 50 Hz / 1ϕ	☐	230 V / 60 Hz / 1ϕ
	☐	400 V / 50 Hz 3PE	☐	400 V / 50 Hz 3NPE
	☐	12 V DC	☐	24 V DC

2.2 EuT operation modes

Mode	Description
1	TX mode

2.3 EuT configuration modes

The EuT was configured to measure its highest possible radiation level. The test modes selected are according to EuT instruction manual.

Mode	Description
1	The EUT has been connected to the mains with the Ethernet cable connected to a PC

2.4 Input/Output Ports

Port	Name	Type*	Cable Max. >3m	Cable Shielded	Description
0	Enclosure	N/E	—	—	—
1	AC mains	AC	☒	☐	Three wires cable
2	Ethernet line	TP	☒	☒	Standard cable

*Note:

AC = AC Power Port DC = DC Power Port N/E = Non-Electrical

I/O = Signal/Control Input or Output Port TP = Telecommunication Port ANT = Antenna Port

2.5 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
AE	PC	—	—	—
AE	Radio communication tester	R&S	CMW 290	—
AE	PMR Remote control	Okeenea	TX1-BUZ	—
AE	IR Remote control	Meliconi	Speedy 2 combo	—

Note: * Use

EUT - Equipment Under Test

AE - Auxiliary/Associated Equipment (Not Subjected to Test)

SIM - Simulator (Not Subjected to Test)

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Nemko Spa
Via del Carroccio, 4
20853 Biassono (MB) – Italy

Tests site/benches are in accordance with applicable standard/s, and have been utilized by Nemko Spa testing engineer(s).

3.2 Environmental conditions

In the laboratory, the following ambient conditions are respected for each test reported below:

Ambient temperature:	18 ÷ 33 °C (1)
Relative Humidity:	25 ÷ 70 % (2)
Atmospheric pressure:	860 ÷ 1060 hPa

(1) For luminaire, temperature during tests was verified to be within 18 ÷ 30 °C
(2) During ESD test, humidity was verified to be within 30 ÷ 60 %

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model	Serial N°
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703
Barometer	Castle	GPB 3300	072015

3.3 Statement of the measurement uncertainty

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002.

The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
Receiver	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Sensitivity measurement	1 MHz ÷ 18 GHz	6.0 dB	(1)
	Conducted	Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)

NOTES:
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %

4 TEST CONDITIONS AND RESULTS

4.1 MPE calculation

4.1.1 Test limits

The device shall comply with the relevant limits for general public exposure specified in [1] as basic restrictions or reference levels:

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m²)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	4 000/f	5 000/f	—
0,025-0,8 kHz	250/f	4/f	5/f	—
0,8-3 kHz	250/f	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	0,73/f	0,92/f	—
1-10 MHz	$87/f^{1/2}$	0,73/f	0,92/f	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	f/200
2-300 GHz	61	0,16	0,20	10

Table 1 - Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)

4.1.2 Calculation method

The power flux density at a distance r from a transmitting antenna in a far-field region is calculated applying the following formula ([3], § 8.3.2):

$$S = \frac{PG}{4\pi r^2}$$

S = power flux density at the distance r, in watts per square meter (W/m2)
P = input power of the antenna, in watts (W)
G = antenna gain (numeric) relative to an isotropic antenna
r = distance from the antenna to the point of investigation, in meters (m)

To calculate the shorter distance to meet the limit of Table 1, the above formula can be rewritten as follow:

$$r = \sqrt{\frac{PG}{4\pi S}}$$

4.1.3 Evaluation

Power density evaluated at a distance of 20 cm (0.2 m):

(for the max measured EIRP value see test report no 422879-1TRFWL, 422879-2TRFWL, 422879-3TRFWL and 422879-4TRFWL issued by Nemko S.p.A. the 2021-05-31).

Frequency (MHz)	Max measured P_{EIRP} (dBm)	Max measured EIRP (W)	Distance (m)	Power density (W/m^2)	MPE limit [1] (W/m^2)	Verdict
		$= 10^{\frac{P_{EIRP}}{10}} \cdot 10^{-3}$		$= \frac{PG}{4\pi r^2}$	10-400 MHz → 2 W/m^2 400-2000 MHz → $\frac{f}{200}$ W/m^2 2-300 GHz →10 W/m^2	
WIFI 2.4	15.0	0.03	0.2	0.06	10	P
WCDMA B1	21.6	0.14	0.2	0.29	9.6	P
WCDMA B8	23.5	0.22	0.2	0.45	4.4	P
LTE B1	20.4	0.11	0.2	0.22	9.6	P
LTE B3	20.7	0.12	0.2	0.23	8.55	P
LTE B7	18.0	0.06	0.2	0.13	10	P
LTE B8	21.9	0.15	0.2	0.31	4.4	P
LTE B20	21.5	0.14	0.2	0.28	4.16	P
LTE B38	18.8	0.08	0.2	0.15	10	P
LTE B40	18.2	0.07	0.2	0.13	10	P
GSM 900	33.4	2.11	0.2	4.19	4.4	P
DCS 1800	29.3	0.85	0.2	1.69	8.55	P

(1) MPE = Maximum Permissible Exposure

For simultaneous transmission, the following equation must be satisfied:

$$\frac{S1}{L1} + \frac{S2}{L2} + \frac{S3}{L3} < 1$$

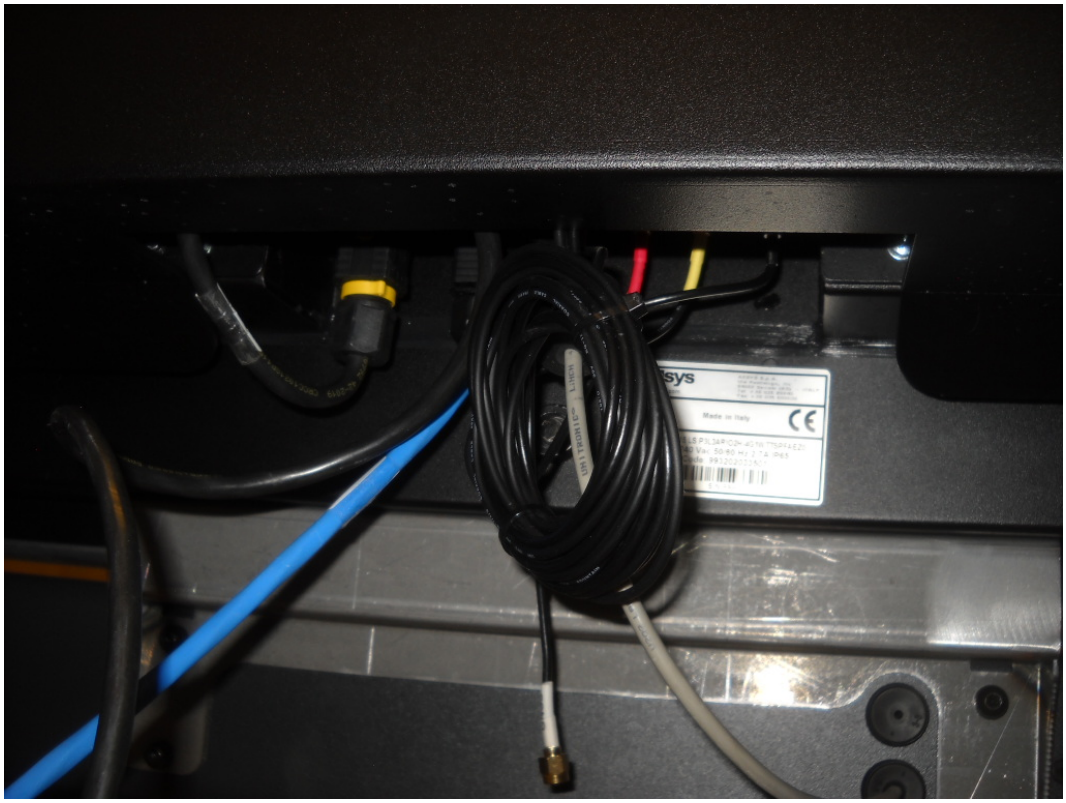
Where:
Si = power density calculated above
Li = limit for the power density

Radio module	Frequency band	Power density (Si)	Power density limit (Li)
WIFI 2.4	2400 MHz to 2483.5 MHz	0.06	10
GSM 900	880 MHz to 915 MHz	4.19	4.4
SUM	0.96		
SUM < 1 verified, then **PASS**			
REMARK: Worst case is with the cellular radio module set to GSM 900 band.			

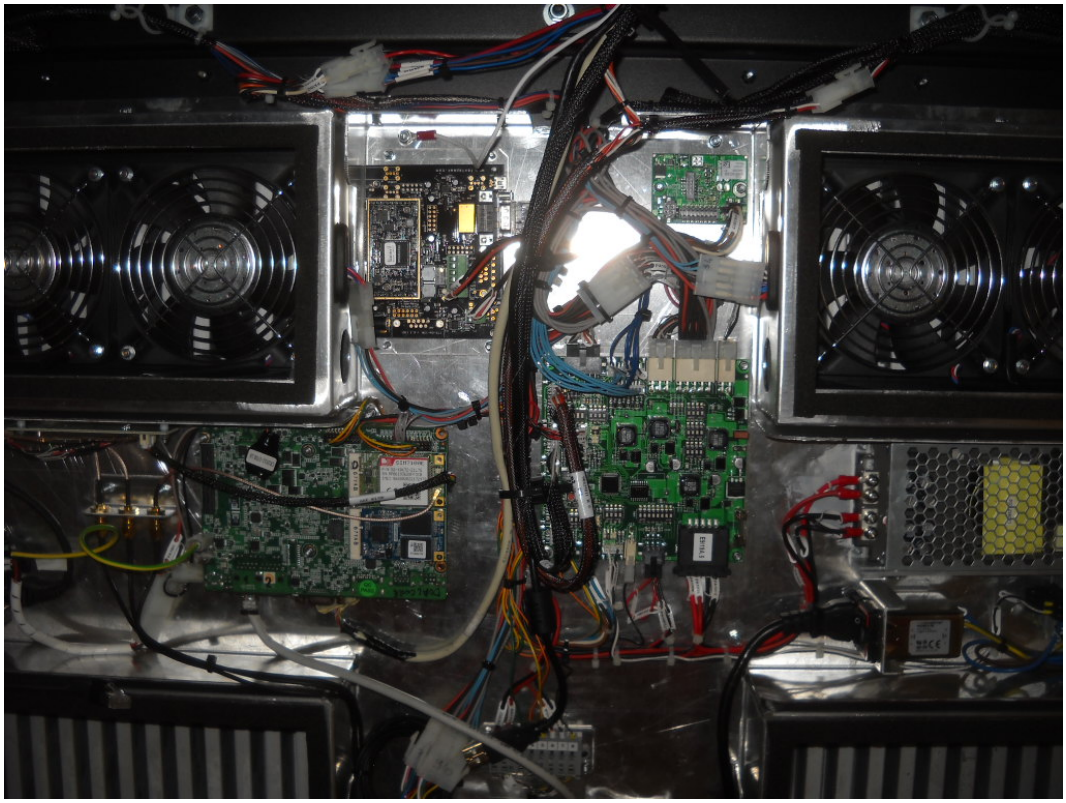
4.1.4 Result

The highest power density estimated at distance of 20 cm (0.2 m) from the transmitting antenna is 4.19 W/m^2. The Recommendation [1] fixes the limit to 4.4 W/m^2; therefore the device demonstrate own conformity at that distance. In addition, it should be take in duly consideration that the above limits are for continuous operating; so the present evaluation is to be considered adequately conservative. Installation instruction shall be report a notice to final users so that a minimal distance of 0.2 m from the radiator (antenna) is maintained in every direction.

5 EUT PHOTOS



aesys
Made in Italy
Slim Soundbar 46" – MONO
S/N 0000803966



End of report